

PACHYHALICTUS STIRLINGI (COCKERELL) (HYMENOPTERA: HALICTIDAE) - A UNIQUE AUSTRALIAN BEE

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Pachyhalictus stirlingi is redescribed, figured and the known distribution presented; the male is described for the first time.

Introduction

The genus *Pachyhalictus* Cockerell contains 31 species found principally in the Asiatic tropics and nearby islands, including New Guinea. Eastern and western limits of the generic radiation have single species intrusions into Australia and Africa respectively. *Pachyhalictus stirlingi* (Cockerell) occurs in north-eastern Australia, while *P. retigerus* (Cockerell) is restricted to south-eastern Africa (Michener 1978).

Blüthgen (1926) described generic characters for *Pachyhalictus* and referred them to a group he termed "*Halictus nomiiformes*". Cockerell (1929) proposed the name *Pachyhalictus* for this group and placed it at subgeneric rank. Michener (1965) originally placed the Australian species, *stirlingi*, in the genus *Lasioglossum* Curtis *s. str.*, commenting that the species was closely allied to *L. merescens* (Cockerell), the type species of *Pachyhalictus*. He later concluded (1965 p.338) that *Pachyhalictus* was not a synonym of *Lasioglossum* proper, but was undecided on its rank. Finally, Michener (1978) proposed generic ranking for *Pachyhalictus* and divided its species into two subgenera, *Pachyhalictus s. str.* found throughout the Indoaustralian region and *Dictyohalictus* Michener with *P. retigerus* its only representative.

Specimens of *P. stirlingi* are not common in collections and may be easily mis-identified as belonging to the genus *Homalictus* Cockerell. Females of both possess similar femoral and ventral metasomal scopal hair type (plumose) and pattern (femoral- originating from dorsal surface; metasomal- rows of long plumose hair across sternites) and the shape and vestiture on the outer apical hind tibial surface is distinctive. *Pachyhalictus* is easily distinguished from *Homalictus* by the presence of strong third transverse cubital and second recurrent veins and the lack of plumose hair tufts on lateral underturned terga. As *P. stirlingi* is the only representative of the tribe Halictini in Australia with strong venation in the forewing, 'unique' is appropriate in the title. Recognition of the male of *Pachyhalictus stirlingi* warranted a redescription of the species enabling all known taxonomic and distributional information to be presented.

Methods and abbreviations

Specimens for SEM study were washed in a warm water and DECON® 90 solution and critical point dried. The labrum was mounted separately on a

micropin, and with the adult, was gold sputter-coated to be examined under a JSM T20 scanning electron microscope at 5kv.

The terminology of morphological features follows Michener (1965, 1978) with the following changes: due to fraying of distal portions of the wings, forewing length is measured from base of arcuate basal vein (vein M) to distal most margin of third submarginal cell (vein 2 r-m); sculpture nomenclature follows Harris (1979); relative measurements are standardised to a head width of 100 units and are directly comparable between sexes.

Abbreviations

Institutions: ANIC, Australian National Insect Collection; NHML, Natural History Museum, London; NMV, Museum of Victoria, Melbourne; RODD, Norman Rodd Private Collection, Mt. Tomah; UQIC, University of Queensland Insect Collection; QM, Queensland Museum.

Descriptive: AOD Antennocular distance; CL Clypeal length; EW Eye width, in side view; FL Flagellum length; GW Genal width, in side view; HL Head length; HW Head width; IAD Interantennal distance; IOD Intercellar distance; LID Lower interorbital distance; OAD Ocellantennal distance; OOD Ocellocular distance; S2-S8 metasomal sterna 2-8; SL Scape length; T1-T6 metasomal terga 1-6; UID Upper interorbital distance.

Pachyhalictus Cockerell

"*Halictus nomiiformes*" Vachal, 1894: 428; Blüthgen, 1926: 400; 1931: 286.

Pachyhalictus Cockerell, 1929: 589 (Type species *Halictus merescens* Cockerell, 1929: 589 original designation); Michener, 1965: 171 & 338; 1978: 515 [full generic description].

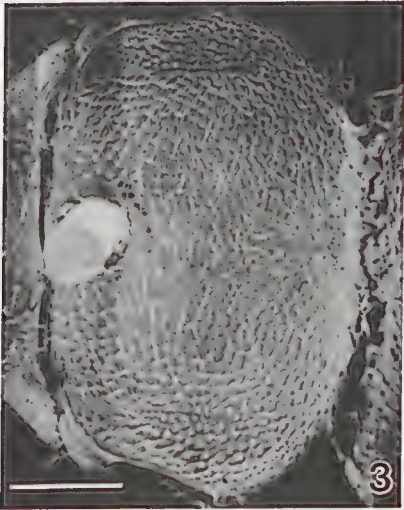
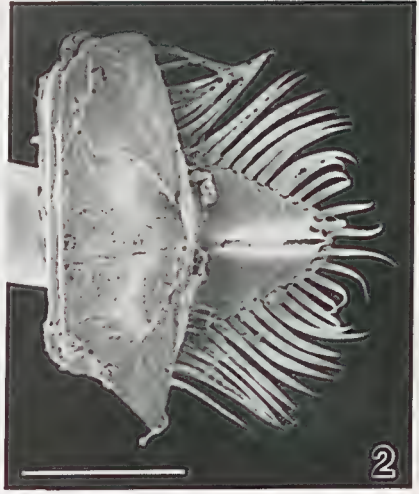
Pachyhalictus stirlingi (Cockerell) (Figs 1-9)

Halictus stirlingi Cockerell, 1910: 232.

Lasioglossum (*Lasioglossum*) *stirlingi* - Michener, 1965: 173.

Pachyhalictus stirlingi - Michener, 1965: 338; -1978: 518.

Type - QUEENSLAND: *holotype* ♀, Mackay April 1900, Turner 1081. (B.M. TYPE HYM. 17.0969) (NHML) (examined, in good condition.)
Additional material examined - (101 ♀♀, 1 ♂) QUEENSLAND: 3 ♀♀, Dunk Is. 25.viii.1927, F.A. Perkins (QM); 1 ♀, Mission Beach 11.x.1984, N.W. Rodd (RODD); 4 ♀♀, 1 ♂, Garners Beach nr Bingil Bay, 10.viii, 12-14.ix.1983, N.W. Rodd (RODD); 1 ♀, Tully River nr Cardstone 13.ix.1983, N.W. Rodd (RODD); 2 ♀♀, Etty Bay, 6 km SE Innisfail 25-27.vii.1982, N.W. Rodd (RODD); 1♀, Babinda 4.i.1951, G.B. (NMV); 4 ♀♀, Bramston Beach 26.viii. 1987, N.W. Rodd (RODD); 4 ♀♀, Fitzroy Is. 13.v 1957, G.B. (NMV); 1 ♀, Kamerunga 8.iv. 1957, A.L.B. (NMV); 1 ♀, Cape Tribulation 16.xii.1986, G. Daniels & M.A. Schneider (UQIC); 1 ♀, Helenvale 23.vii.1982, N.W. Rodd (RODD); 2 ♀♀, Cooktown 18.vii.1982,



Figs 1-4. *Pachyhalictus stirlingi* ♀ (1) frontal view of head; dorsal views of: (2) labrum; (3) mesoscutum; (4) propodeum. Scale lines 1, 3-4 = 0.5mm; 2 = 0.25mm.

N.W. Rodd (RODD); 2 ♀♀, 30 km NW Cooktown 19.vii.1982, N.W. Rodd (RODD); 15 ♀♀, 3 km NE Mt. Webb 1-3.viii.1980, J.C. Cardale, on flowers *Thrytomene oligandra* (ANIC); 1 ♀, Mt Webb Nat. Pk 50 km N Cooktown, 11-14.vii.1976, G.B. & S.R. Monteith (ANIC); 2 ♀♀, Mt Webb Nat. Pk 28-30.ix.1980, J.C. Cardale (ANIC); 1 ♀ same data, on flowers *Parinari nonda* (ANIC); 1 ♀ same data, on flowers *Kunstleria blackii* (ANIC); 2 ♀♀, 7 km N Hope Vale Mission 4.x.1980, J.C. Cardale (ANIC); 9 ♀♀ same data, on flowers *Melastoma polyanthum* (ANIC); 3 ♀♀, 14 km W by N Hope Vale Mission 8-10.x.1980, J.C. Cardale (ANIC); 7 ♀♀ same data, on flowers *Melastoma polyanthum* (ANIC); 1 ♀, 5 km S by W Rounded Hill nr Hope Vale Mission 7.x.1980, J.C. Cardale (ANIC); 5 ♀♀, Rainforest on Blackwater Ck, 12 km N Hopevale 11.vii.1976, G.B. & S.R. Monteith (ANIC); 1 ♀, Endeavour R., (Nth Branch), 22 km NW Cooktown 9-19.vii.1976, G.B. & S.R. Monteith (ANIC); 1 ♀, Moses Ck, 4 km N by E Mt Finnigan 14-16.x.1980, J.C. Cardale (ANIC); 1 ♀, Annan R., 3 km W by S Black Mt 27.ix.1980, J.C. Cardale, on flowers *Eucalyptus* sp. (ANIC); 3 ♀♀, Shiptons Flat 17-19.x.1980, J.C. Cardale (ANIC); 1 ♀, Cape York, 5.vi.1985, N.W. Rodd (RODD); 1 ♀, Peach Creek Crossing, 25 km NNE of Coen 4-5.vii.1976, G.B. & S.R. Monteith (ANIC); 1 ♀, Leo Creek Road, ca. 500 m, McIlwraith Range, 30 km NE Coen 29.vi-4.vii.1976, G.B. & S.R. Monteith (ANIC); 4 ♀♀ same data (UQIC); 1 ♀, Claudie R., 1 mile W Mt Lamond 20.xii.1971, D.K. McApline, G.A. Holloway, D.P. Sands; 4 ♀♀, Captain Billy Creek, Cape York Pen. 9-13.vii. 1975, S.R. Monteith (ANIC); 1 ♀, Dividing Ra., 15 km W of Captain Billy Creek, Cape York Pen. 4-9.vii.1975, S.R. Monteith (ANIC); 1 ♀, ENE Mt. Tozer 11-16.vii.1986, J.C. Cardale (ANIC); 5 ♀♀, Lockerbie Area, Cape York 13-27.iv.1973, S.R. Monteith (ANIC); 1 ♀, Eet Hill Vicinity, Moa (Banks) Is. Torres Str., 9-13.vii.1977, G.B. Monteith & D. Cook (UQIC).

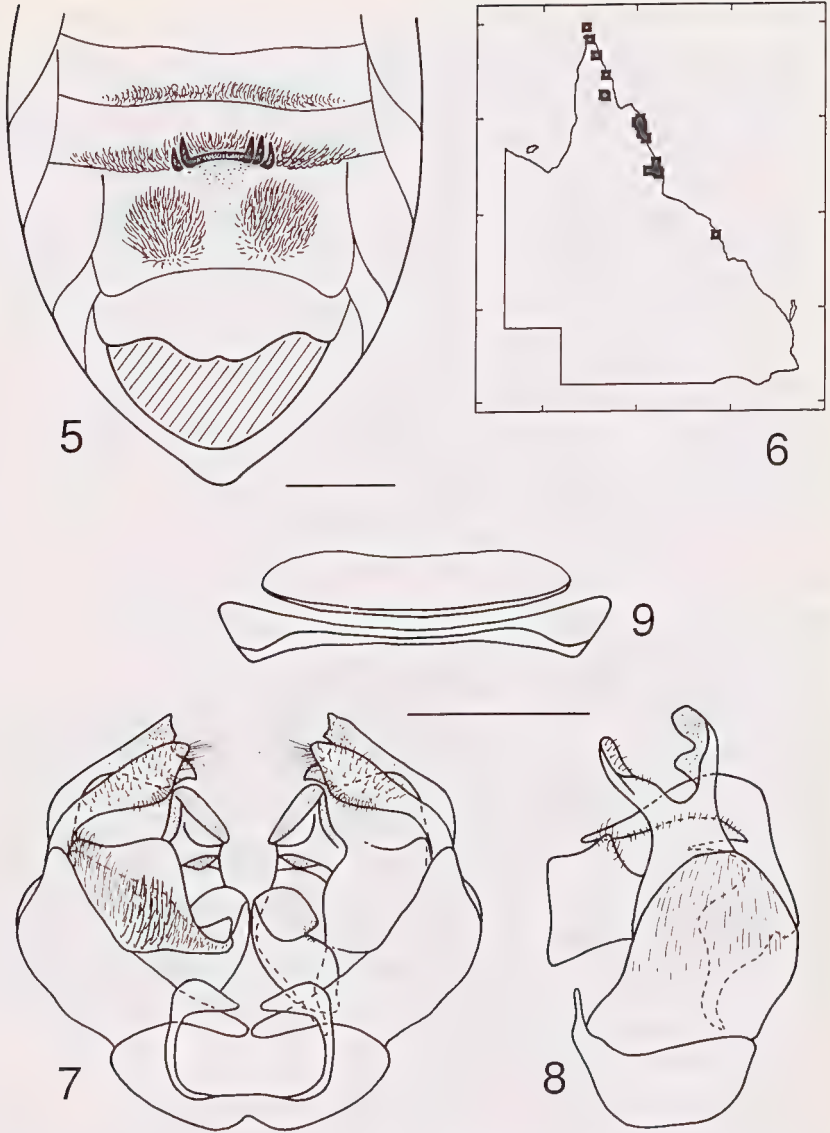
General diagnosis. Small robust black bees with characteristic hair patterns on the females and basal bands of pale tomentum on metasomal terga of both sexes. The metasomal sternum IV of males is armed with coarse bristles and each bifid genital gonostylus bears a membranous retrorse lobe.

Description

Female

Body length. 5.54-7.08 mm (\bar{x} =6.50 mm SD=0.32 n=35), (holotype 6.32 mm); Forewing length 4.47-5.16 mm (\bar{x} =4.85 mm SD=0.20 n=35), (holotype 4.93 mm). Relative measurements: HW: 100; HL: 78-80; UID: 54-55; LID: 49-50; AOD: 19-20; IAD: 09-11; OAD: 32-33; IOD: 15-16; OOD: 12-13; CL: 19-20; GW: 15-16; EW: 22-23; SL: 36-37; FL: 64-66.

Structure. Frons, vertex, mesoscutum and scutellum coarsely eticulate (Figs 1, 3); head (Fig. 1) broad, 0.80 x as broad as long, inner orbits converging below, median frontal carina extends 0.6 x to median ocellus, eyes with sparse cover of minute setae, scape extends to anterior margin of



Figs 5-9. *Pachyhalictus stirlingi* (5) ventral view of male metasoma (note: except for several teeth, S4 hidden beneath S3); (6) known distribution; (7) ventral view of male genitalia, note: left penis valve and volsella and right retrorse lobe only partly drawn; (8) lateral view of male genitalia; (9) sterna 7 & 8. Scale lines = 0.5mm. Upper line for 5, lower for 7-9.

median ocellus, clypeus weakly concave along midline, strongly convex in side view, less than half extends below lower level of eyes, coarsely sculptured with longitudinal striae angled towards midline, median basal area reticulate, supraclypeal area rounded, moderately protuberant, covered with fine reticulate pattern and weakly punctured. Labrum (Fig. 2) distal process triangular, smooth sided, tapering to pointed apex, median keel only, fimbrial setae acutely pointed. Pronotum with small obtuse dorsolateral projections; dorsal surface of propodeum (Fig. 4) 0.75 x length of scutellum, sculpture areolate-rugose, margins defined by carinae, posterior margin truncate; hind basitibial plate defined, forming obtuse angle apically; inner hind tibial spur pectinate with 6 rounded, apically directed teeth; T1 shining almost impunctate mesially, punctate laterally, remaining terga densely punctate.

Colour. Black, mandibles dark red at apex, antennal flagellar segments, and legs brown, some specimens with apical half of hind tibiae light red-brown; tomentose hair white or yellow.

Vestiture. Head and mesoscutum with sparse erect branched light brown hair, except tufts laterally on propodeum; metanotum densely tomentose; T2-T4 with tomentum across tergum.

Male

Body length. 6.01 mm; Forewing length 1.58 mm. Relative measurements: HW: 100; HL: 79; UID: 59; LID: 48; AOD: 17; IAD: 13; OAD: 32; IOD: 19; OOD: 17; CL: 20; GW: 10; EW: 24; SL: 34; FL: 92.

Structure. Differs from female as follows: sculpture features similar to female except less coarse; mandibles simple; eyes converging strongly below; hind basitibial plate absent; inner hind tibial spur coarsely serrate to finely pectinate; T1 almost impunctate across entire surface; weak lateral tomentum present on T2-T3; posterior margin of T6 defined by a raised carina posteriorly; sterna as follows (Fig. 5), S4 underneath and hidden by S3 except S4 with apical series of three large, erect teeth on each side of midline (right side missing one tooth), S5 concave along midline, midline bare, either side with large setal pad, vestiture on S2-S3 with long branched hair arising across sternal plate; remaining vestiture similar to female except fore, mid and hind trochanters and fore femora with long branched hair arising from ventral surface.

Colour. Head, mesoscutum and scutellum dark brown-black except clypeus mesially and antennal flagellar segments underneath light brown, remainder of body light brown, pygidial plate yellow-brown.

Genitalia and associated sterna. (Figs 7-9) Gonocoxites broad, gonobase narrow; gonostyli strongly bifid, retrorse lobes well developed, setose on inner margin; volsellae heavily sclerotised ventroapically; penis valves weakly flanged dorsally, inferior basal process well developed; S7 & S8 weakly sclerotised.

Distribution (Fig. 6). Known from coastal central and northern

Queensland, well within the 500 mm rainfall isohyet.

Associated Organisms. One specimen (14 km W by N Hope Vale Mission (ANIC)) had evidence of associated organisms and a parasite. This specimen carried hypopial nymphal mites on the basal half of T1 and a strepsipteran puparium protruded laterally between T4 and T5.

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